II. Status Of All Claims

Claims 37-44 and 82-90 are hereby withdrawn provisionally, with the understanding that they be reinstated should it be determined that the relevant regulations require rescission of the restriction requirement. Similarly, claims 45, 61, and 91-93 are withdrawn provisionally. In that regard, Applicants believe that claim 61 ought to be reinstated should the Examiner agree with Applicants' argument that independent claim 46 of Species 1 also qualifies as being generic to the sole claim of Species 3.

The claims are reprinted below for the Examiner's convenience. (The claims are set forth below in the manner required by 37 C.F.R. §1.121, as amended July 30, 2003.)

1-17. (Canceled)

18. (Previously Presented) A coil for use with a magnetic resonance imaging (MRI) system to form images of a region of interest during an MRI scanning procedure, said coil comprising:

(a) a first ring at one end of said coil, said first ring being electrically conductive and having a first diameter;

(b) a second ring at an other end of said coil, said second ring being electrically conductive and having a second diameter different from said first diameter of said first ring; and

(c) a plurality of rods electrically interconnecting said first and said second rings to form said coil therewith, each of said rods having a linear portion and a tapered portion with said linear portion being connected to said first ring and said tapered portion being connected to said second ring, said tapered portions of said rods collectively providing said coil with a substantially homogeneous pattern of magnetic flux density in at least one of three orthogonal imaging planes of said coil.

19. (Previously Presented) The coil claimed in claim 18 wherein said coil is a birdcage coil.

20. (Previously Presented) The coil claimed in claim 18 wherein said second diameter of said second ring is smaller than said first diameter of said first ring.

21. (Previously Presented) The coil claimed in claim 18 wherein said tapered portion of each of said rods comprises at least one angled linear segmented section.

22. (Previously Presented) The coil claimed in claim 18 wherein said tapered portion of each of said rods has a radius that is selected to maximize homogeneity of said magnetic flux density in at least one of an XZ plane and a YZ plane of said imaging planes of said coil.

23. (Previously Presented) The coil claimed in claim 18 wherein said first ring and said second ring are each larger in diameter than a center of said coil to thereby enable a concentration of said magnetic flux density to be produced at a region centered within said coil.

24. (Previously Presented) The coil claimed in claim 18 further comprising at least one additional coil at least partially overlapping said coil at an inferior end thereof to form therewith, and for operation as, a phased array.

25. (Previously Presented) The coil claimed in claim 18 wherein said first and said second rings are circular.

26. (Previously Presented) The coil claimed in claim 18 wherein said first and said second rings are elliptical with said first diameter being a major diameter of said first ring and said second diameter being a major diameter of said second ring.

27. (Previously Presented) The coil claimed in claim 18 wherein said coil is a receive-only coil.

28. (Previously Presented) The coil claimed in claim 18 wherein said coil is a transmit/receive coil.

29. (Previously Presented) The coil claimed in claim 18 wherein each of said rods and said first and said second rings contain therein a plurality of reactive electrical components.

30. (Previously Presented) The coil claimed in claim 18 wherein said coil is configured as one of a low pass coil, a high pass coil and a band pass coil.

31. (Previously Presented) The coil claimed in claim 18 wherein said coil is operable in one of a linear mode and a quadrature mode.

32. (Previously Presented) A coil for use with a magnetic resonance imaging (MRI) system to form images of a region of interest during an MRI scanning procedure, said coil comprising:

(a) a first ring at one end of said coil, said first ring being electrically conductive and having a first diameter;

(b) a second ring at an other end of said coil, said second ring being electrically conductive and having a second diameter; and

(c) a plurality of rods electrically interconnecting said first and said second rings to form said coil therewith, each of said rods at each end thereof having a tapered portion, said tapered portions being selected to maximize homogeneity of magnetic flux density in said coil.

33. (Previously Presented) The coil claimed in claim 32 wherein said first and said second diameters of said first and said second rings, respectively, are equal.

34. (Previously Presented) The coil claimed in claim 32 wherein said first and said second diameters are each larger than a diameter at a center of said coil such that said tapered portions of said rods are tapered outwardly.

35. (Previously Presented) The coil claimed in claim 32 wherein said first and said second diameters are each smaller than a diameter at a center of said coil such that said tapered portions of said rods are tapered inwardly.

36. (Previously Presented) The coil claimed in claim 32 wherein said coil is a birdcage coil.

37. (Withdrawn) A method of designing a coil capable of exhibiting a substantially homogeneous pattern of magnetic flux density while at least one of avoiding substantial degradation of, maintaining and improving signal-to-noise ratio performance, said method comprising the steps of:

(a) providing a model of a conventional resonator, said conventional resonator having a first end ring and a second end ring interconnected by a plurality of rods;

(b) ascertaining said magnetic flux density within said resonator; and

(c) adjusting a geometry of at least one of said first end ring, said second end ring and said rods, to improve the homogeneity of said magnetic flux density and thereby form said coil.

38. (Withdrawn) The method as claimed in claim 37 wherein said coil is a birdcage coil.

39. (Withdrawn) The method as claimed in claim 37 wherein the step of providing a model of a conventional resonator comprises using a wire model thereof.

40. (Withdrawn) The method as claimed in claim 37 wherein the step of ascertaining said magnetic flux density involves at least one of Biot-Savart modeling and experimental verification.

41. (Withdrawn) The method as claimed in claim 37 wherein the step of adjusting involves changing at least one of (i) a diameter of said first end ring, (ii) a diameter of said second end ring and (iii) a radius of a taper of said rods by which said rods are connected to said end rings.

42. (Withdrawn) The method as claimed in claim 37 wherein the step of adjusting optionally applies to a length of said rods when said signal-to-noise ratio performance of said coil is less important.

43. (Withdrawn) The method as claimed in claim 37 wherein the step of adjusting is performed iteratively.

44. (Withdrawn) The method as claimed in claim 37 further comprising the step of adjusting a volume of said coil to improve said signal-to-noise ratio performance thereof.

45. (Withdrawn) A birdcage coil for use with a magnetic resonance imaging (MRI) system to form images of a region of interest during an MRI scanning procedure, said birdcage coil comprising:

(a) a first ring at an inferior end of said birdcage coil, said first ring being electrically conductive and having a first diameter through which said region of interest is provided access to said birdcage coil;

(b) a second ring at a superior end of said birdcage coil, said second ring being electrically conductive and having a second diameter smaller than said first diameter of said first ring; and

(c) a plurality of rods electrically interconnecting said first and said second rings to form said birdcage coil therewith, each of said rods having a linear portion and a tapered portion with said linear portion being connected to said first ring and said tapered portion being connected to said second ring, said tapered portions of said rods collectively providing said birdcage coil with a substantially homogeneous pattern of magnetic flux density in at least one of three orthogonal imaging planes of said birdcage coil while at least one of maintaining and improving a signal-to-noise ratio of said birdcage coil.

what type of conductive member 112

46. (Previously Presented) A coil for use with a magnetic resonance (MR) system, said coil comprising:

(a) a plurality of conductive members each having a linear portion and a tapered portion;

(b) said plurality of conductive members arranged to form a first opening having a first diameter and a second opening having a second diameter different from said first diameter; and

(c) said tapered portions of said conductive members providing said coil with a substantially homogeneous pattern of magnetic flux density in at least one of three orthogonal imaging planes of said coil.

47. (Previously Presented) The coil claimed in claim 46 wherein said coil is a birdcage coil.

48. (Previously Presented) The coil claimed in claim 46 wherein said second diameter of said second opening is smaller than said first diameter of said first opening.

49. (Previously Presented) The coil claimed in claim 46 wherein said tapered portion of each of said conductive members comprises at least one angled linear segmented section.

50. (Previously Presented) The coil claimed in claim 46 wherein said tapered portion of each of said conductive members has a radius that is selected to maximize homogeneity of said magnetic flux density in at least one of an XZ plane and a YZ plane of said orthogonal imaging planes of said coil.

51. (Previously Presented) The coil claimed in claim 46 wherein said first opening is formed by a first conductive ring and said second opening is formed by a second conductive ring, with said linear and said tapered portion of each of said conductive members being serially connected and thus electrically interconnecting said first and said second conductive rings.

52. (Previously Presented) The coil claimed in claim 46 wherein said first opening is adapted for accommodating insertion of a head of a patient into said coil.

53. (Previously Presented) The coil claimed in claim 46 wherein said conductive members of said coil are supported by a housing therefor.

54. (Previously Presented) The coil claimed in claim 46 wherein said first and said second openings are circular.

55. (Previously Presented) The coil claimed in claim 46 wherein said first and said second openings are elliptical with said first diameter being a major diameter of said first opening and said second diameter being a major diameter of said second opening.

56. (Previously Presented) The coil claimed in claim 46 wherein said coil is a receive-only coil.

57. (Previously Presented) The coil claimed in claim 46 wherein said coil is a transmit/receive coil.

58. (Previously Presented) The coil claimed in claim 46 wherein said conductive members contain therein a plurality of reactive electrical components.

59. (Previously Presented) The coil claimed in claim 46 wherein said coil is configured as one of a low pass coil, a high pass coil and a band pass coil.

60. (Previously Presented) The coil claimed in claim 46 wherein said coil is operable in one of a linear mode and a quadrature mode.

61. (Withdrawn) A coil array for use with a magnetic resonance (MR) system, said coil array comprising:

(a) a first coil having a plurality of conductive members such that:

(i) each of said conductive members has a linear portion and a tapered portion;

(ii) said plurality of conductive members are arranged to form a first opening having a first diameter and a second opening having a second diameter, with said second diameter being different from said first diameter; and

(iii) said tapered portions of said conductive members providing said first coil with a substantially homogeneous pattern of magnetic flux density in at least one of three orthogonal imaging planes of said first coil; and

(b) at least one additional coil at least partially overlapping said first coil at an inferior end thereof to form therewith, and for operation as, said coil array.

62. (Previously Presented) A coil for use with a magnetic resonance (MR) system, said coil comprising:

(a) a first end having a first diameter;

(b) a second end having a second diameter different from said first diameter; and

(c) a plurality of conductive rods extending between said first and said second ends, each of said conductive rods having a linear portion and a tapered portion with said linear portion being connected to said first end and said tapered portion being connected to said second end, said tapered portions of said conductive rods providing said coil with a substantially homogeneous pattern of magnetic flux density in at least one of three orthogonal imaging planes of said coil.

63. (Previously Presented) The coil claimed in claim 62 wherein said coil is a birdcage coil.

64. (Previously Presented) The coil claimed in claim 62 wherein said second diameter of said second end is smaller than said first diameter of said first end.

65. (Previously Presented) The coil claimed in claim 62 wherein said tapered portion of each of said conductive rods comprises at least one angled linear segmented section.

66. (Previously Presented) The coil claimed in claim 62 wherein said tapered portion of each of said conductive rods has a radius that is selected to maximize homogeneity of said magnetic flux density in at least one of an XZ plane and a YZ plane of said orthogonal imaging planes of said coil.

67. (Previously Presented) The coil claimed in claim 62 wherein said first end includes a first conductive ring and said second end includes a second conductive ring, with said conductive rods electrically interconnecting said first and said second conductive rings.

68. (Previously Presented) The coil claimed in claim 67 wherein said first conductive ring and said second conductive ring are each larger in diameter than a center of said coil to thereby enable a concentration of said magnetic flux density to be produced at a region centered within said coil.

69. (Previously Presented) The coil claimed in claim 62 further comprising at least one additional coil at least partially overlapping said coil at an inferior end thereof to form therewith, and for operation as, a phased array.

70. (Previously Presented) The coil claimed in claim 62 wherein said first and said second ends are circular.

71. (Previously Presented) The coil claimed in claim 62 wherein said first and said second ends are elliptical with said first diameter being a major diameter of said first end and said second diameter being a major diameter of said second end.

72. (Previously Presented) The coil claimed in claim 62 wherein said coil is a receive-only coil.

73. (Previously Presented) The coil claimed in claim 62 wherein said coil is a transmit/receive coil.

74. (Previously Presented) The coil claimed in claim 67 wherein each of said conductive rods and said first and said second conductive rings contain therein a plurality of reactive electrical components.

75. (Previously Presented) The coil claimed in claim 62 wherein said coil is configured as one of a low pass coil, a high pass coil and a band pass coil.

76. (Previously Presented) The coil claimed in claim 62 wherein said coil is operable in one of a linear mode and a quadrature mode.

77. (Previously Presented) A coil for use with a magnetic resonance (MR) system, said coil comprising:

(a) a first end having a first diameter;

(b) a second end having a second diameter; and

(c) a plurality of conductive rods extending between said first and said second ends, each of said conductive rods at each end thereof having a tapered portion, said tapered portions being selected to maximize homogeneity of magnetic flux density in said coil.

78. (Previously Presented) The coil claimed in claim 77 wherein said first and said second diameters of said first and said second ends, respectively, are equal.

79. (Previously Presented) The coil claimed in claim 77 wherein said first and said second diameters are each larger than a diameter at a center of said coil such that said tapered portions of said conductive rods are tapered outwardly.

80. (Previously Presented) The coil claimed in claim 77 wherein said first and said second diameters are each smaller than a diameter at a center of said coil such that said tapered portions of said conductive rods are tapered inwardly.

81. (Previously Presented) The coil claimed in claim 77 wherein said coil is a birdcage coil.

82. (Withdrawn) A method of designing a coil capable of exhibiting a substantially homogeneous pattern of magnetic flux density while at least one of avoiding substantial degradation of, maintaining and improving signal-to-noise ratio performance, said method comprising the steps of:

(a) providing a model of a conventional resonator, said conventional resonator having a first end and a second end between which extend a plurality of conductive rods;

(b) ascertaining said magnetic flux density within said resonator; and

(c) adjusting a geometry of at least one of said first end, said second end, and said conductive rods to improve the homogeneity of said magnetic flux density and thereby form said coil.

83. (Withdrawn) The method as claimed in claim 82 wherein said coil is a birdcage coil.

84. (Withdrawn) The method as claimed in claim 82 wherein said first end includes a first conductive ring and said second end includes a second conductive ring, with said conductive rods electrically interconnecting said first and said second conductive rings.

85. (Withdrawn) The method as claimed in claim 82 wherein the step of providing a model of a conventional resonator comprises using a wire model thereof.

86. (Withdrawn) The method as claimed in claim 82 wherein the step of ascertaining said magnetic flux density involves at least one of Biot-Savart modeling and experimental verification.

87. (Withdrawn) The method as claimed in claim 82 wherein the step of adjusting involves changing at least one of (i) a diameter of said first end, (ii) a diameter of said second end and (iii) a radius of a taper of said conductive rods at least at one end thereof.

88. (Withdrawn) The method as claimed in claim 82 wherein the step of adjusting optionally applies to a length of said conductive rods when said signal-to-noise ratio performance of said coil is less important.

89. (Withdrawn) The method as claimed in claim 82 wherein the step of adjusting is performed iteratively.

90. (Withdrawn) The method as claimed in claim 82 further comprising the step of adjusting a volume of said coil to improve said signal-to-noise ratio performance thereof.

91. (Withdrawn) A birdcage coil for use with a magnetic resonance (MR) system for at least one of obtaining images of a region of interest and ascertaining the spectra of said region of interest during an MR scanning procedure, said birdcage coil comprising:

(a) an inferior end having a first diameter through which said region of interest is provided access to said birdcage coil;

(b) a superior end having a second diameter smaller than said first diameter of said inferior end; and

(c) a plurality of conductive rods extending between said inferior and said superior ends, each of said conductive rods having a linear portion and a tapered portion with said linear portion being connected to said inferior end and said tapered portion being connected to said superior end, said tapered portions of said conductive rods providing said coil with a substantially homogeneous pattern of magnetic flux density in at least one of three imaging planes of said birdcage coil while at least one of maintaining and improving a signal-to-noise ratio of said birdcage coil.

92. (Withdrawn) The birdcage coil claimed in claim 91 wherein said inferior end includes a first conductive ring and said superior end includes a second conductive ring, with said conductive rods electrically interconnecting said first and said second conductive rings.

93. (Withdrawn) The birdcage coil claimed in claim 91 wherein said tapered portion of each of said conductive rods has a radius that is selected to maximize homogeneity of said magnetic flux density in at least one of an XZ plane and a YZ plane of said imaging planes.